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UNIVERSAL CHILD IMMUNIZATION, 1990

Progress report

SUMMARY

Dramatic progress has been made during the past several years towards reaching the goal of universal child immunization (UCI). Global immunization levels in 1990 rose to greater than 80 per cent for poliomyelitis, diphtheria, pertussis, tetanus and tuberculosis and to 80 per cent for measles, saving the lives of an estimated 3 million children and protecting the health of millions more. In progressing towards this goal, a system was established to reach the previously unreached and a foundation was laid for tackling more complex and wide-ranging goals in the new decade. This success was a result of excellent international collaboration, as well as the commitment of developing countries to invest in building systems to reach all of their children with immunization services. More than 80 countries have given priority to accelerating immunization coverage and have been striving to achieve the 1990 goal or to maintain UCI target levels. Unprecedented mobilization by political leaders, government ministries, communities and a host of non-governmental organizations has established new patterns of collaboration in health care, with the extensive involvement of religious leaders, teachers, women's groups, unions, etc. Combined with radio, television, print and traditional means of communication, such mobilizations have greatly supported a revitalized, goal-oriented health system.

The present report discusses progress in the developing world and reviews overall achievements and performance by region. It also offers an analysis of the factors for success and lessons learned, estimates the cost involved and support provided and outlines the remaining challenges to implementing the next phase of UCI and achieving the immunization goals set for the 1990s.

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INTRODUCTION

1. Historically, infectious diseases have accounted for much of the suffering and mortality in the world, often decimating populations and having the most devastating effects on the very young. Immunization has been practised for the last 200 years, but until the last few decades has provided only marginal protection against infectious diseases. A major breakthrough occurred during the 1960s and early 1970s when the great killer smallpox was eliminated from the earth by a massive global immunization campaign. Following this success, the World Health Organization (WHO) established the expanded programme on immunization (EPI) in 1974 to protect against tuberculosis, measles, diphtheria, pertussis (whooping cough), tetanus and poliomyelitis.

2. It has been estimated that at the end of the 1970s, approximately 5 million children's deaths from these six diseases could have been prevented every year in a safe, cost-effective manner through immunization programmes. This number of deaths was greater than would occur from the total devastation of a city the size of Rome each year.

3. Successful immunization programmes require that facilities be established and technical personnel be available to serve all communities of the developing world in order to deliver timely immunizations to children and mothers. Because the vaccines are not heat stable, a cold chain is needed from the vaccine manufacturers to the clinic or vaccination point. This cold chain includes cold rooms, freezers, refrigerators, cold boxes and vaccine carriers, all linked together with an effective management system. Sterile syringes and needles are required and immunizations must be given appropriately by well-trained health personnel. Informed parents and community leaders are equally critical to children receiving appropriate immunizations as early as possible in life, according to recommended schedules. Thus, programmes must include active promotional and educational elements.

I. UNIVERSAL CHILD IMMUNIZATION

4. Following the establishment of EPI in 1974, immunization programmes were established in many developing countries. By 1980, however, global coverage levels were no greater than 20 per cent. In 1977, the World Health Assembly challenged the countries of the world to achieve universal child immunization (UCI) by the year 1990. 1/ Many considered this goal unattainable, but during the 1980s a great international movement was created and significant progress made. With coverage levels of less than 20 per cent in 1980, it became apparent that in order to achieve levels of 80 per cent by 1990, the programme would need to be accelerated. Government health ministries could not achieve the goal alone. The whole of society had to be mobilized. High-level political support and multisectoral cooperation would be needed in order to marshall the resources required, both nationally and internationally, to complete national cold chains and delivery systems and to generate sufficient

public understanding and motivation so that parents would seek out immunization for their children by the time they reach one year of age.

5. In 1982, UNICEF launched the child survival and development revolution with a select group of cost-effective, high-impact interventions (growth monitoring, oral rehydration therapy, breast-feeding, immunization, food, female education and family planning) known as the "GOBI-FFF" package. Collaboration between UNICEF and WHO in the immunization effort intensified. The building of an international coalition began in 1984, with the organization of the Task Force for Child Survival, sponsored jointly by WHO, the United Nations Development Programme (UNDP), the World Bank, UNICEF and the Rockefeller Foundation. In 1985, the Executive Board and the United Nations General Assembly affirmed their full support for the goal of UCI by 1990 and were joined by 74 Governments and more than 400 voluntary organizations, who pledged to support UCI by 1990 in commemoration of the fortieth anniversary of the United Nations. Funding for the programme was expanded significantly in 1985 with pledges of more than $100 million by the Government of Italy and Rotary International. Highly publicized national campaigns in Colombia and Turkey increased public awareness of the fact that rapid progress could be made through extensive social mobilization.

Table 1

Calendar of key mobilization events

1974	*EPI established*
1977	*Last case of smallpox*
1977	*World Health Assembly set UCI 1990 goal*
1978	*Health For All conference at Alma Ata, USSR*
1982	*Child survival and development revolution launched*
1984	*Task Force for Child Survival established at Bellagio, Italy*
1984	*Operation Commando in Burkina Faso*
1984	*National Vaccination Crusade in Colombia*
1985	*UNICEF Executive Board and United Nations General Assembly affirm support for UCI 1990*
1985	*"WE THE PEOPLE" declaration*
1985	*Second "Bellagio" meeting at Cartagena, Colombia*
1985	*Canada launches an international programme for support of immunization*
1985	*National Immunization Campaign in Turkey*
1985	*Government of Italy pledges support for immunization*
1986	*Rotary International "Polio Plus" programme launched*
1986	*African Immunization Year*
1988	*Third "Bellagio" meeting at Talloires, France*
1990	*Fourth "Bellagio" meeting at Bangkok, Thailand*
1990	*World Summit for Children*

6. By 1987, nearly all countries had established accelerated immunization programmes and were utilizing a variety of strategies to improve immunization coverage. These strategies included (a) national mass campaigns, with full social mobilization of religious leaders, teachers and other community leaders; (b) national immunization days, with intensive media support; (c) improving the efficiency and capacity of health services by actively providing immunization to children at all contacts with the health system; (d) enumerating target children and rigorously tracking each child to assure completion of the vaccination series by the first birthday; and (e) mandating early immunization in order to qualify for school or other government services or benefits.

A. Coverage achievements

1. Global progress

7. Immunization coverage in developing countries has increased nearly fourfold from a base of approximately 20 per cent in 1981 to reach the 1990 goal of 80 per cent. Owing to the increasing population, this reflects a fivefold increase in real terms in the total number of children immunized. At the end of 1989, coverage with BCG had reached 85 per cent, while coverage for three doses of poliomyelitis and DPT3 vaccines were at 78 and 75 per cent, respectively. Measles coverage was at 71 per cent. Coverage for two doses of tetanus toxoid (TT2) for pregnant women climbed to 44 per cent, but will still require special attention in the next several years. TT2 coverage was not included in the UCI 1990 targets, although many countries gave much attention to this element of the programme during the latter half of the 1980s.

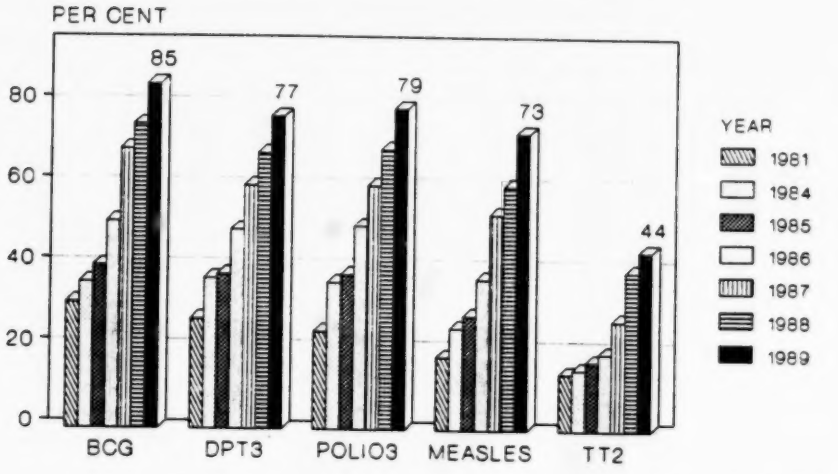
8. At the time of preparation of the present report, complete performance data for 1990 had not yet been received and compiled. However, preliminary data from key countries indicated that 1990 achievements would be markedly higher than those of 1989. 2/

9. At the end of 1990, it was expected that 80 per cent coverage would be reached globally for three doses of poliomyelitis and DPT3 and that BCG would exceed the 80 per cent target. The figure for measles coverage, likely to be between 75 and 80 per cent, is lower, in part owing to the fact that reporting is restricted to vaccinations administered to infants between the ages of 9 and 12 months. Surveys have shown higher coverage in many countries among children aged up to 18 months.

10. The number of developing countries achieving their UCI targets has also increased each year. In 1986, only 16 countries had achieved 80 per cent coverage or greater for all antigens. This increased to 34 countries in 1988 and to 43 by 1989. In 1989, an additional 40 countries had coverage greater than 60 per cent and were striving to reach their targets during 1990. It was expected that approximately 60 countries would reach UCI by the end of 1990 and another 15 to 20 would achieve it for all antigens except measles.

Figure 1

INCREASE IN IMMUNIZATION COVERAGE
FOR CHILDREN UNDER ONE *
IN DEVELOPING COUNTRIES



* TT2 for pregnant women

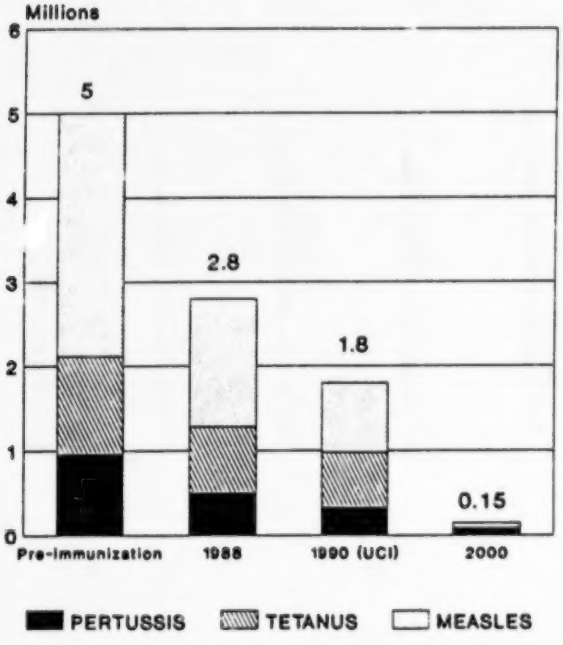
(China not included in 1981, 1984 and 1985)

October 1990

11. At these coverage levels, WHO estimates that 3 million deaths from measles, neonatal tetanus and whooping cough, in addition to more than 400,000 cases of poliomyelitis, were prevented in 1990. During the 1980s, the total estimated number of deaths prevented was 13 million. These figures, of course, can only be estimates and do not take into account children whose lives were protected against immunizable diseases, but who subsequently died from other causes. As can be seen in figure 2 below, of the immunizable diseases, measles, tetanus and pertussis are the major killers.

Figure 2

Estimated reduction in deaths from immunizable diseases, 1980-2000



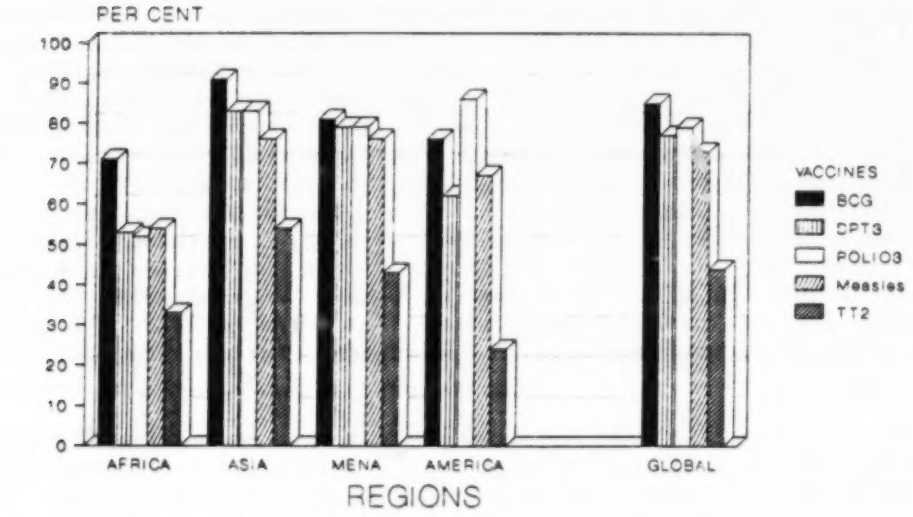
WHO estimates

2. Progress by region

12. As can be seen in figure 3 below, all regions have made excellent progress. Asia and the Middle East and North Africa have achieved the highest levels for all antigens. The Americas region began the decade with higher levels of coverage. Africa has required much more extensive development of health infrastructures.

Figure 3

IMMUNIZATION COVERAGE BY REGION, 1989



Per cent children under one year of age

TT2=per cent pregnant women
October 1990

Asia

13. The goal of 80 per cent coverage for each antigen was expected to be reached for the region as a whole, although about 10 countries may not achieve this level. In 1989, the weighted average for all Asian countries was 91 per cent for BCG, 83 per cent for DPT3 and the third dose of poliomyelitis and 76 per cent for measles. This was a dramatic increase over the level of 44 per cent for DPT in 1985. Nearly all of the Asian countries gradually expanded their immunization programmes to provide routine access to services and then utilized intensive media support to increase demand and coverage.

Middle East and North Africa

14. The Middle East and North Africa region had nearly reached the 80 per cent UCI by 1990 goal by the end of 1989. The regional average was 81 per cent for BCG, 79 per cent for DPT3 and the third dose of poliomyelitis and 76 per cent for measles. All countries of the region were attempting to reach the target by the end of 1990. In 1986, coverage for DPT3 and measles stood at 62 and 58 per cent, respectively. Although several countries had successful programmes that reached more than 60 per cent of children in the mid-1980s, the acceleration of activities and high level of political interest began with the national immunization campaign of Turkey in 1985. Delegations

from several countries in the region, as well as from other regions, attended the launching of one of the three immunization rounds and were motivated to accelerate their own programmes.

The Americas

15. The countries of the Americas region were attempting to reach two major immunization goals by the end of 1990 - 80 per cent coverage for all antigens and the eradication of poliomyelitis. This dual goal required special strategies. The strategy for eliminating the transmission of the wild poliomyelitis virus was to implement a series of two national immunization days per year to administer the poliomyelitis vaccine to all children under five years of age, which was augmented by an intensive search for poliomyelitis cases. When a suspected case was found, all children in the community were given the poliomyelitis vaccine as part of a "containment" strategy. This initiative, under the leadership of the Pan American Health Organization (PAHO) and with the support of Rotary International, the United States Agency for International Development (USAID) and UNICEF, was successful in nearly eliminating poliomyelitis in the region. During 1990, only 10 cases were confirmed.

16. The quest to reach UCI has required a focus upon immunizing all children under one year of age with all antigens. Although nearly all countries in the region have established infrastructures offering routine vaccinations, national immunization days have served to augment this service and have been responsible for improving coverage rates. When Colombia initiated the first national campaign in the region in 1984, regional averages for DPT3 and the third dose of measles vaccine were 54 and 52 per cent, respectively. By the end of 1989, they had risen to 62 and 67 per cent, respectively. It was anticipated that all except five countries would have reached the 80 per cent target in 1990.

Africa

17. Excellent progress was made during the past five years in sub-Saharan Africa, despite a low level of infrastructure development and extremely difficult economic and social constraints. The acceleration of activities and the high-level political commitment in the region began with "Operation Commando" in Burkina Faso in 1984, when more than 1 million children were immunized in a three-week period. Campaigns in the Congo and Senegal followed. Further momentum was created when African ministers of health defined the UCI by 1990 goal for their countries at 75 per cent and declared the "African Immunization Year" in 1986. Coverage for measles in sub-Saharan Africa in 1986 stood at 37 per cent.

18. By the end of 1989, the weighted regional average for DPT3, three doses of poliomyelitis and measles in Eastern and Southern Africa had reached 58 per cent. Twelve of 20 countries in the region had reached the 75 per cent target set for 1990. At the end of 1990, all countries except four (Angola, Ethiopia, Mozambique and Somalia) were expected to have reached their target.

The four countries have all been severely disrupted by war and civil conflict. In spite of these handicaps, excellent progress was made in areas under government control.

19. Despite many difficulties in West and Central Africa, substantial progress was made towards the 1990 goal. At the end of 1989, three countries had reached 75 per cent or greater for all antigens (Cape Verde, the Congo and the Gambia). Cape Verde and the Gambia have well-developed infrastructures and have managed to reach high levels of performance without special activities. The Congo began to accelerate its programme through a very successful national immunization campaign in 1986 and has followed it up with special activities in urban areas. Several countries have developed their immunization programmes together with a more comprehensive set of health activities in the context of the Bamako Initiative. Nigeria has gradually expanded services to all local government areas and has been using an intensive campaign approach to reach the 75 per cent goal.

B. Other achievements

1. Universal policies and programme strategy

20. Immunization services are now perhaps the most widely available health-care activities throughout the developing world. The achievement of this scale in such a short time was because of the clarity of policies and the distinctiveness of immunization as an activity. Unlike nutrition, the control of diarrhoeal diseases (CDD) and other illnesses, the immunizable diseases are prevented by one distinct action at one time (or in a brief series of contacts during the first year of life) and require no subsequent action, although they must be sustained in order to reach subsequent cohorts of newborns. The medical or technical aspects of the programme were developed or refined earlier in industrialized countries. The process is easily understood by lay persons, political leaders and the community at large. In many societies, injections are viewed as "sophisticated medicine" and are, therefore, popular. Under the dynamic technical leadership of the WHO EPI, the vaccines, immunization schedules, contra-indications and other technical issues have been nearly universally accepted by the medical profession, programme managers and families. This clarity in programme objectives and operational strategy was one of the main factors that facilitated moving to scale rapidly.

2. Political will and social mobilization

21. The drive for UCI during the 1980s was unprecedented. More than 80 countries have acknowledged the potential for saving lives and preventing suffering and have accelerated their programmes. Beginning with President Betancourt of Colombia in 1984, more than 30 heads of State have lent their personal prestige and political support to the immunization programme. Their roles have varied from publicly launching a campaign and appearing on television or posters to personally organizing and implementing a national intersectoral monitoring system. Spouses of heads of State have been active in many countries as well. Although individual leaders have changed

over the years, in most cases the political appeal and support have transcended personalities and the goals have been adopted by new leaders. This high level of support has ensured that similar political priorities are maintained at provincial, district and community levels. Long-term support has been enjoyed largely because of the attractiveness and clarity of the simple messages that children can be protected by an easily understandable intervention and through the timely feedback of progress through monitoring, which also introduces accountability at different levels.

22. The social mobilization process has been nearly as varied as the countries themselves and has evolved through experience of both Governments and UNICEF. Large-scale national campaigns of the mid-1980s, which relied upon hundreds of temporary immunization points and thousands of non-health ministry workers to deliver immunization services, were very useful in initiating the acceleration phase, although countries using this strategy had difficulties in maintaining high coverage levels through a routine delivery system.

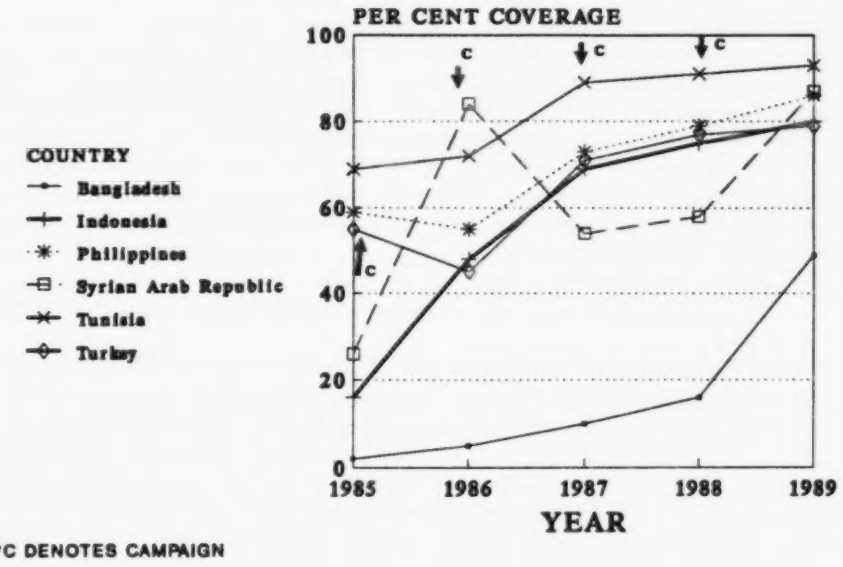
23. Figure 4 below compares the experience of six countries. The Syrian Arab Republic, Tunisia and Turkey relied upon national campaigns to accelerate coverage increases. The Syrian Arab Republic and Turkey utilized temporary immunization sites in mosques or schools during their national campaigns and had difficulty in maintaining the level of coverage reached during the campaign year. Continued mobilization was required to reach the UCI target and to institute routine high levels of coverage. Tunisia, with a complete infrastructure, was able to increase coverage quickly with a national campaign, and maintained nearly 90 per cent coverage during subsequent years.

24. Bangladesh, Indonesia and the Philippines chose to move gradually by expanding routine access to services and by completing their cold chains before utilizing intense promotional campaigns. It is fairly clear that none of those countries would have reached current coverage levels without special social mobilization activities. A review of most developing countries has shown that very few have been able to reach and maintain 80 per cent coverage or greater without promotional efforts. The exceptions have had excellent health systems with the capacity to reach into communities and follow up with "defaulters". Several countries, most notably China and Viet Nam, have enjoyed great success in enumerating children by name and, through a joint effort involving community health workers and the community, in ensuring that children complete the basic series of immunizations according to schedule. This system is preferable to having health workers set demographic-based targets.

25. The quest for UCI has forced the health systems of many countries to initiate multisectoral collaboration in order to reach their targets. During the past six years, much experience has been gained in how best to use religious leaders and schoolteachers to promote the demand for immunization. Both Moslem leaders in the Middle East and Asia and Christian priests in South America have played important roles. Many promotional materials were developed based upon the tenets of the religions and can, in turn, be used to promote other health interventions.

Figure 4

IMMUNIZATION COVERAGE TRENDS IN SELECTED COUNTRIES, 1985-1989



26. In general, the use of media such as television, radio, printed materials, puppets and traditional forms of entertainment became more fully developed as countries learned from the experience of others. The high level of political commitment to UCI resulted in the precedent of free air time on television and radio. In many countries, immunization messages were aired during prime time. Innovation has been rampant. Logos, mottos and brief messages have been found upon such commonplace items as match boxes, flour bags, cement bags, postage stamps, city buses and food containers in Africa, Asia, Latin America and the Middle East. Several countries have initiated intensive social mobilization activities for CDD and other health interventions following their positive experience with immunization promotion.

27. The clarity of the immunization coverage objectives and the ease of translating national targets into local ones have created important opportunities for community and local government leaders, at district and provincial levels, to supervise and coordinate the mobilization of resources of both communities and local governments to ensure compliance with immunization schedules, reduce drop-out rates and provide important support to usually underpaid health workers. The 80 per cent target has also required more complete development of community outreach systems. The outreach developed for immunization could easily be used to deliver other health care services.

3. Extensive international cooperation and resource mobilization

28. The success of the UCI movement has been totally dependent upon excellent cooperation between Governments of the developing countries and the international donor community.

29. The major donors for the global immunization programme, listed according to the amount of contributions made, have been the Governments of Italy, Sweden, Canada (together with the Canadian National Committee for UNICEF and Canadian non-governmental organizations (NGOs)), the United States of America, Rotary International and the Governments of Norway and the United Kingdom of Great Britain and Northern Ireland. This funding has been implemented both bilaterally and through UNICEF and WHO and now exceeds $100 million annually. Table 2 below shows the sources and amounts of supplementary funds provided to UNICEF by the donor community.

Table 2

Supplementary funds contributed to UNICEF for UCI by donor, 1986-1990

Income Year
(In millions of United States dollars)

Donor	1986	1987	1988	1989	1990	Total
Australia		0.3	0.5	1.2	0.8	2.8
Canada	2.0	10.5	10.1	5.6	6.8	35.0
Italy*	13.0	19.2	19.5	16.3	0.6	68.8
Netherlands	0.2				6.5	6.7
Nigeria				3.8	2.3	6.1
Norway	0.8		5.0	3.7	4.3	13.8
Sweden	0.6	21.9	16.3	18.7	18.1	75.6
United Kingdom	0.4	7.8	1.9			10.1
United States	2.0	4.1	23.5	6.0	5.3	40.9
EEC**		4.0				4.0
Canada National Committee		2.0	6.0	3.1	1.0	12.1
Canada NGO		1.6	5.3	2.0	0.5	9.4
Rotary International	0.6	0.2	7.9	15.9	17.0	41.6
Other donors	6.3	5.8	3.5	3.8	2.4	21.8
Total for UCI	25.9	77.4	99.7	80.1	65.6	348.7
Total supp. funds excl. emergency	127.4	198.3	235.0	186.9	192.0	939.6

* In addition to the amounts contributed for programme expenses, the Government of Italy has made the following amounts available for international procurement:

1986	1987	1988	1989	1990	Total
20.7	25.5	21.0	18.8	0.3	86.3

** Multi-annual contribution. This is an approximate amount allocated for UCI as an element of a PHC programme.

NOTE: 1990 amounts are subject to closure of accounts.

SOURCE: UNICEF Programme Funding Office.

30. General resources allocated to immunization programmes are shown in table 3 below. During the 1980s, nearly $500 million were contributed to UCI programmes through UNICEF.

31. The Government of Italy has been the largest donor to UNICEF in support of the global immunization programme. A 1985 letter of understanding initiated a programme of cooperation in 27 countries in Africa and several countries in Central America. Assistance from Italy was critical to developing and expanding the capacity of those African countries to provide immunization services to their children. Italy also made a special contribution of $3 million to provide sterilization equipment in several countries. A total of over $150 million was contributed between 1986 and 1990.

32. The Government of Sweden has been a major contributor to immunization programmes, both through UNICEF and bilaterally. The Governments of Sweden, Canada and the United States have been the primary donors to the universal immunization programme in India. Angola, Bangladesh and Sri Lanka are among the other countries that have benefited from Swedish support.

33. In 1985, Canada launched a special initiative - the international immunization programme - which was managed by the Canadian Public Health Association, in cooperation with a wide range of voluntary organizations. The programme, called "A Miracle in the Making", has disbursed $41 million, more than $12 million raised by Canadian NGOs. At the end of 1990, support was being provided to a total of 95 projects in 44 Commonwealth and francophone countries. Canada has been a major supporter of the immunization programme in India. Current commitments include support for the measles elimination programme in the Caribbean.

Table 3

Expenditure of general resources and supplementary funds for UCI, 1986-1990

(In millions of United States dollars)

Source	1986	1987	1988	1989	1990	Total
General Resources	57.0	40.4	28.2	44.2	62.0	231.8
Suppl. Funds		45.5	56.0	69.7	73.0	244.2
Total for UCI	57.0	85.9	84.2	113.9	135.0	476.0

NOTE: 1990 amounts are subject to closure of accounts.

SOURCE: UNICEF Programme Statistics.

34. The United States Government child survival programme has provided major support to the global immunization programme since 1985, with a total of $300 million. More than $40 million in supplementary funding has been received by UNICEF for activities in India and other countries. Technical support from the United States Public Health Service to UNICEF-supported programmes has been especially useful.

35. Rotarians world-wide have played a substantive role in the UCI drive. Following the launch of the "Polio Plus" initiative in 1986, a total of $226 million was collected against a target of $120 million. Collaboration between UNICEF and Rotary International began in 1986, with an agreement for UNICEF to procure the poliomyelitis vaccine on behalf of Rotary. Over $41 million has been received for this purpose. Smaller amounts have also been received to support cold-chain and social mobilization activities.

36. In the Americas region, inter-agency coordinating committees were set up at the country level with host Governments and programme donors (the Government of Canada, PAHO, UNICEF, USAID and Rotary International). Integrated plans of action with funding requirements were developed and agreed upon, including resource pledges by all agencies. Other regions are interested in establishing similar mechanisms to ensure adequate funding to reach the goals for the 1990s and to sustain programme achievements.

37. The cost of immunizing a child varies greatly from country to country - from $5 to $25 for routine programmes - although the cost of the vaccines is less than $1. However, if an average of $13 per child is used, the annual cost of immunizing 80 per cent of infants in developing countries is approximately $1 billion. It is expected that 80 to 90 per cent of this cost will be borne by the Governments themselves, leaving approximately $100 million to $150 million required from external sources. This level of support will be required throughout the first half of the decade in order to sustain the high coverage levels achieved by the end of 1990.

38. In addition to the resources needed to maintain EPI operations, it is estimated that the following will be needed to support the disease eradication, elimination and control activities outlined in paragraphs 50 to 65 below:

(a) Poliomyelitis eradication will require $12 million annually between 1991-1995 and $16 million annually for the rest of the decade;

(b) Neonatal tetanus elimination will require $10 million annually for the period 1991-1995;

(c) The addition of new vaccines to EPI will require considerably more resources, although the incremental cost for each vaccine should be modest.

4. Management information systems and goal orientation

39. In 1980, most developing countries did not have adequately functioning reporting systems and consequently could not assess programme performance. The WHO EPI supported the development of national information management systems to record, collect and forward coverage data to higher levels. Computer programmes were written to facilitate this process and have been implemented in many countries in all regions. The cluster survey technique was developed to provide both an interim monitoring system and a check for the reliability of routine monitoring systems. The cluster survey has been a key tool for more comprehensive programme evaluations. These evaluations are carried out periodically with teams from government and donor agencies that support the programme. The reviews have been very useful in providing opportunities for donor representatives to witness firsthand both the achievements and the constraints of the programme. More recently, cluster surveys and programme reviews have focused attention on regions of countries that are not performing as well and, thus, have been an effective tool for microplanning and problem solving at district and lower levels.

5. Reliable and affordable vaccine supplies

40. The UNICEF supply system has served very effectively to procure vaccines at low cost both for donation to programmes and on behalf of Governments and Rotary International. A total of 4.4 billion doses have been procured since 1982, at a cost of $177.2 million. The demand for UNICEF-procured vaccines will continue to rise as coverage continues to increase and disease eradication programmes accelerate. The Supply Division estimates that a total of 5.6 billion doses will be procured at a cost of approximately $362.6 million over the next five years. Many countries have already requested UNICEF support for providing hepatitis B vaccine, as well as the triple antigen vaccine for measles, mumps and rubella.

41. At the request of UNICEF, WHO has provided technical and biological standards for vaccines to designated vaccine manufacturers that meet these standards for the UNICEF bidding process.

6. Improved cold-chain, sterilization and injection equipment

42. One of the major challenges for the global immunization programme is to protect vaccines from heat during the long journey from the manufacturer to the most remote immunization points in developing countries. The vaccines must either be kept frozen or at near to freezing temperatures at all times. WHO and UNICEF have an exceptional record of collaboration in working with the private sector to develop improved equipment to store and transport vaccines, as well as to provide for safe injections. A joint EPI technical series has been maintained since 1979, providing guidance and technical specifications for cold-chain, sterilization and injection equipment and has been very useful in enhancing equipment standardization and minimum-cost procurement.

43. A number of technological developments have been made. The use of solar-powered equipment has been pioneered in Africa and other regions. Kerosene refrigerators have been improved so as to take into account the lower quality fuel available in many countries. Special temperature indicators have been used extensively to monitor the status of the cold chain at all levels. Steam sterilization has been promoted, together with the use of affordable plastic sterilizable syringes. The sterilizers were developed by the private sector and tested jointly in the field by WHO and UNICEF. Similar units are now being developed to handle the sterilization of other health centre utensils to protect against the spread of acquired immune deficiency syndrome (AIDS) or hepatitis.

44. The use of sterile syringes and needles has been a major challenge, especially in countries affected by AIDS or hepatitis B. Disposable syringes are used in many countries because officials are concerned that sterilization is done improperly. The disposal of these syringes has been a problem and many are re-used several times, increasing the risk of infection. UNICEF and WHO have supported the development of syringes that cannot be used more than once. They are to be shipped in a box that also functions as an incinerator, complete with a fuel stick. This single-use syringe is expected to be available commercially during 1991.

45. Continued support had also been requested for upgrading and replacing the cold chain and for providing injection and sterilization equipment, and will be required in order to sustain the immunization programme in most developing countries during the next several years.

7. Universal child immunization and strengthening of primary health care

46. By the end of 1990, approximately 80 per cent of the world's infants had each had at least five contacts with the health system. Allowing for drop-out rates, as many as 600 million contacts were made, providing an excellent opportunity for health workers to provide additional services, both preventive and curative. At present, the comprehensiveness of such services varies widely. Those countries with the most developed health infrastructures are more easily able to provide more interventions. Outreach systems could easily be organized to deliver vitamin A and other supplements on a periodic basis. Mobile teams could also be organized to provide more services, although on a less frequent basis.

47. During the past seven or eight years, there has been extensive debate as to the wisdom of accelerating immunization as a "vertical" programme. Those arguing for a more comprehensive set of activities moving to scale gradually cite cost-effectiveness, local priority setting, a larger overall impact on disease control, sustainability and the need for a comprehensive range of health services to be provided if primary health care (PHC) is to be established. Those in favour of rapidly accelerating the immunization programme as a "cutting or leading edge" intervention cite simplicity; the generation of a critical mass of political will; the offering of a critical preventive service at scale, reaching the previously unreached; the

establishment of management information and logistics systems that could later support other interventions; and the development of extensive social mobilization towards reachable goals.

48. In many countries in Africa, the structures built by UCI have evolved into PHC structures through the Bamako Initiative.

8. Going to scale

49. A major contribution of the UCI experience has been the knowledge gained by going to scale. Although there have been numerous successful experiences of development programmes and projects at pilot scale, few have gone to scale to reach national and universal coverage. While experiences of the "Green Revolution" and literacy campaigns in the 1960s were comparable in scope and magnitude, they took place only in selected countries and, unlike UCI, were not world-wide. UCI was probably the first successful world-wide experience to mobilize intersectoral inputs and societies towards achieving a sectoral (health) objective, whose achievement at the same time instilled confidence in other countries to attempt other, more ambitious goals.

II. GOALS FOR THE 1990s

50. With the confidence gained by the dramatic success of UCI, the World Health Assembly adopted four immunization-related goals to be achieved during the 1990s, which were also endorsed by the UNICEF/WHO Joint Committee on Health Policy, the 1989 Executive Board and the World Summit for Children, as follows:

(a) Global eradication of poliomyelitis by the year 2000;

(b) Elimination of neonatal tetanus by 1995;

(c) Reduction by 95 per cent of measles deaths and reduction by 90 per cent of measles cases in 1995, compared with pre-immunization levels, as a major step towards global eradication of measles in the longer run;

(d) Maintenance of a high level of immunization coverage (at least 90 per cent of children under one year of age by the year 2000) against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis and against tetanus in women of child-bearing age.

A. Poliomyelitis eradication

51. The global eradication of poliomyelitis is a great challenge. Based on the recent experience in the Americas region, however, where transmission of the wild poliomyelitis virus was expected to be blocked in 1990, a global eradication strategy and plan of action were laid out by WHO and approved by the World Health Assembly in 1989. The plan includes the following main areas of activity:

(a) Improving and maintaining high levels of immunization coverage. Achieving at least 80 per cent coverage with potent vaccines at the district level will be emphasized through the continued strengthening of the immunization delivery system. The continued upgrading and replacement of cold-chain facilities and training and supervision of health workers will be priority activities to ensure that vaccines remain potent until the time of administration. Vaccine delivery will continue to be carried out together with other vaccines as a component of EPI;

(b) Disease surveillance to locate suspected poliomyelitis cases. Surveillance systems will be developed to report suspected cases of poliomyelitis (at least monthly) and to trigger outbreak investigation and action to contain the spread of the disease in the outbreak area;

(c) Laboratory services. Because other medical conditions can mimic poliomyelitis, good laboratory facilities are required to isolate the poliomyelitis virus from stool samples and from the environment to confirm the diagnosis and also to confirm that the wild poliomyelitis viruses are no longer circulating in the environment. A three-tiered global laboratory network is now being established following the pattern utilized successfully in the Americas. This will include national laboratories, reference laboratories and specialized laboratories;

(d) Training of health workers will be integrated mostly within EPI, but specific training for outbreak investigation and control and clinical and laboratory diagnosis of poliomyelitis will also be undertaken;

(e) Rehabilitation of victims will focus on recent cases, where early intervention in the community by health workers and families can avert much of the need for surgical treatment. Other priority activities will be the improvement of braces (calliper splints) for children requiring them and the development and dissemination of improved guidelines on the selection and treatment of children requiring surgical treatment;

(f) Research and development will include the improvement of poliomyelitis vaccines in terms of formulation, efficacy with fewer doses and heat stability, the development of better diagnostic tests and operations research to improve management efficiency of the eradication effort.

52. During the first five years of the decade, it is hoped that much of the world (the Americas, Europe and the Western Pacific) will be free of poliomyelitis, thus allowing for a global focus on specific areas during the last half of the decade, in order to attain global eradication by the year 2000.

B. Elimination of neonatal tetanus

53. Tetanus among newborns claims about 750,000 young lives each year. Although eradication is not possible because tetanus spores can live outside the human host, neonatal tetanus has virtually disappeared from industrial

countries because of sanitary childbirth practices in health institutions. The umbilical cord must kept be sterile immediately after delivery and for the next few days. However, many infants in the developing world are delivered in unsanitary conditions, often by untrained attendants, and in many cultures the umbilical stump is treated with materials that contain tetanus organisms. The training of birth attendants in the "three cleans" (ensuring clean hands, clean delivery surfaces and care of the umbilical cord) can have an effect on reducing the risk of neonatal tetanus, but this will not be enough. The protection of mothers with tetanus toxoid immunization prior to or during pregnancy will not only give the mother immunity against tetanus, but will also provide the newborn with protection at birth and until it can receive DPT vaccinations at six weeks of age.

54. The strategy for the elimination of neonatal tetanus will include providing the tetanus toxoid vaccine to all women of child-bearing age, ideally before pregnancy. A total of five properly spaced doses will protect both the mother and the newborn throughout the child-bearing years. It is hoped that young girls will receive DPT3 immunization during the first year of life, another dose at school entry and two additional doses before leaving school. However, in the short run (the next five years), emphasis will have to be placed on ensuring that all pregnant women receive TT2 prior to childbirth. All women should be screened whenever they visit health facilities and given tetanus toxoid vaccine. It is hoped that those measures, together with the emphasis on clean deliveries, will eliminate neonatal tetanus during the next five years.

55. A global plan of action to eliminate neonatal tetanus by 1995 has been developed and includes the promotion of tetanus toxoid immunization as an integral part of EPI and through the safe motherhood initiative, established in 1987 by WHO, the World Bank and the United Nations Population Fund (UNFPA) and supported by many other organizations.

56. Implementation of this plan includes the development of extensive training materials for use at national and subnational levels and the development of a slow-release vaccine that would require one or two injections to deliver the required lifetime five-dose schedule. The remainder of the plan is to be implemented through the normal integrated EPI.

C. Measles control

57. Measles, the largest killer among immunizable diseases, is also the most infectious of the EPI diseases, which has accounted for the difficulty in controlling it, even in industrial countries with many years of high coverage levels. It will also be very difficult to control in developing countries where health services are not as developed and living conditions are more difficult. Many children are malnourished and live in crowded conditions, thus allowing epidemics to spread. In developing countries, measles seems to strike at a much earlier age than in industrial countries, often before nine months of age. Recent research has shown the efficacy of a high-potency

Edmonston-Zagreb strain of vaccine in children as young as six months of age. In October 1989, the EPI Global Advisory Group recommended that this vaccine be administered to children at six months of age in countries and areas in which early measles is a problem. The challenge now is to find adequate quantities of the vaccine to meet the needs of such countries.

58. Since measles is a special problem in both industrial and developing countries, the goal is the reduction of cases by 90 per cent and deaths by 95 per cent from pre-immunization levels by 1995. It is hoped that measles will be completely eradicated in the early years of the next century. This will require high levels of immunization coverage in all communities of all countries at the earliest possible age. Some countries are using a combined vaccine for measles, mumps and rubella. In addition to high immunization levels, measles surveillance will be emphasized so that cases can be found on a timely basis and epidemics controlled.

59. English-speaking countries of the Caribbean region have adopted the goal of eliminating measles by 1995. Their strategy is to immunize all children between 12 months and 15 years of age by May 1991, regardless of their previous immunization status. Thereafter, all children will be given measles, mumps and rubella vaccine at 12 months of age. A two-dose schedule for all children is also being considered.

60. The major challenges during the next five years will be to increase measles vaccination coverage to very high levels at the earliest possible age (six months) in most developing countries and to apply a second dose as required to control the disease. International cooperation in sharing strategies and successes from both industrial and developing countries will be very important as lessons are learned.

D. Children's vaccine initiative

61. It has been estimated that reaching the 80 per cent mark will result in a significant reduction in deaths from measles, pertussis, diphtheria and poliomyelitis, to a level of approximately 1.8 million per year. True universal protection has not yet been achieved for several reasons: the vaccines are not 100 per cent effective; they are often given too late; infants (or their mothers) do not receive the full series and become "dropouts"; and some vaccines lack adequate stability to withstand heat and become impotent before use.

62. Experts have been concerned that these goals will be difficult to achieve without improvement in the vaccines currently used in EPI, which protect against six diseases. In addition, with the capacity of the global immunization programme to reach an estimated 100 million infants yearly, an extraordinary opportunity exists to deliver either new or existing additional vaccines to protect against other diseases that afflict children.

63. WHO estimates that an additional 5 million to 6 million deaths from viral and bacterial diseases such as bacterial diarrhoeas, hepatitis A, C, and E, rotavirus, meningococcal meningitis, dengue and acute respiratory infections could be prevented annually with new vaccines, which either have already been developed or could yet be developed with existing technologies. Millions of lives also could be saved annually with an effective vaccine against malaria.

64. UNICEF has provided considerable support to the global immunization programme during the past 10 years by providing a significant portion of the vaccines used in developing countries, as well as much of the cold-chain equipment to protect this investment in vaccines.

65. UNICEF has been requested to participate in the children's vaccine initiative. Document E/ICEF/1991/P/L.31 presents the background on this initiative and outlines the role UNICEF could play if its participation in the initiative is approved by the Executive Board.

Notes

1/ The 1980 target for UCI has been operationally defined globally as 80 per cent coverage of children by their first birthday for each of the following: one dose of anti-tuberculosis vaccine (BCG), three doses each of combined diphtheria/pertussis/tetanus (DPT3) and poliomyelitis vaccines, and one dose of measles vaccine. African ministers of health set a regional target of 75 per cent, while China selected 85 per cent as its target for national, provincial and county levels.

2/ A companion paper has also been prepared using 1990 performance data (E/ICEF/1991/L.8/Add.1) and provides a more detailed analysis of country-by-country achievements.